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T. A. EDISON.

Patented Sept. 11, 1900.

PROCESS OF MAKING METALLIC DUPLICATE PHONOGRAPH RECORDS.

(Application filed May 4, 1900.)

(No Model.)

Fig. 3

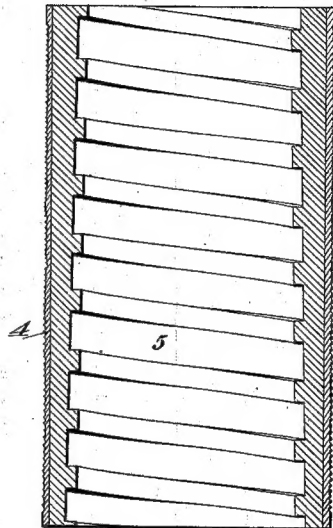


Fig. 2

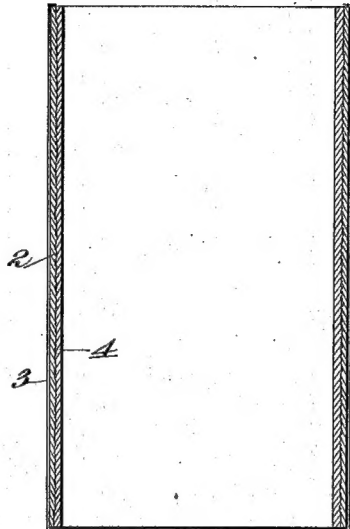
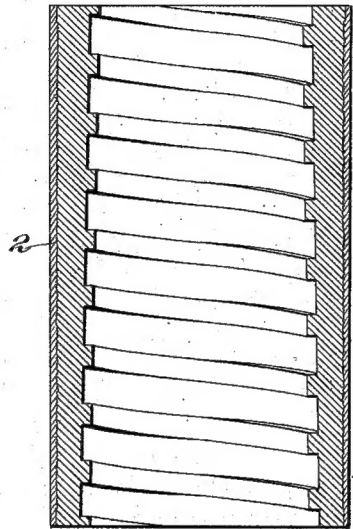


Fig. 1



Witnesses:

*Geo. F. Coleman*  
*Wm. H. S. Reed*

Inventor

*Thomas A. Edison*  
by *Geo. F. Coleman* *Wm. H. S. Reed*  
Att'ys.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

## PROCESS OF MAKING METALLIC DUPLICATE PHONOGRAPH-RECORDS.

SPECIFICATION forming part of Letters Patent No. 657,527, dated September 11, 1900.

Application filed May 4, 1900. Serial No. 15,453. (No specimens.)

### *To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Process of Making Metallic Duplicate Phonograph-Records, (Case No. 1,035,) of which the following is a description.

My present invention relates to an improved process for securing from an original phonographic record an absolutely-accurate metallic copy thereof. By means of my improved process records possessing a high intrinsic value may be copied with absolute accuracy, so as to be preserved indefinitely. The process also provides for the making from original records of accurate metallic masters suitable for use in the making of subsequent duplicates by a mechanical process, as is now practised, and which masters by reason of their metallic character will permit the making of a very much larger number of duplicates by a mechanical process than is now possible.

In carrying my invention into effect I first obtain a suitable metallic matrix, bas-relief, or negative copy of an original record. Assuming the original record to have been formed on a cylindrical blank, this matrix will be in the form of a cylindrical shell with the record in negative or relief within its bore. I then deposit a different metal upon the surface of the matrix carrying the record in negative or bas-relief until the desired thickness of deposit is secured, after which I subject the matrix carrying the metal deposited thereon or therein to a treatment by which the deposited metal will be freed from the matrix, so as to therefore carry upon its surface an absolutely-accurate copy of the original record. I prefer to make the matrix of copper and to deposit silver upon the surface of the matrix carrying the record, whereby a silver copy will be secured, and to dissolve the copper matrix from the silver deposit by treatment with hydrochloric acid or other solvent of copper which does not affect silver; but it will be understood that other metals may be used which may be subjected to other treatments for the separation of the matrix from the metallic deposited copy.

In carrying my invention specifically into

effect I may conveniently adopt the following procedure, from which the scope and modifications of which my invention is susceptible will be apparent, reference being had to the accompanying drawings, which are illustrative of the process, and wherein—

Figure 1 represents a longitudinal sectional view through an ordinary cylindrical phonograph-record, illustrating the deposition of a matrix thereon; Fig. 2, a corresponding view showing the matrix separated from the record, coated on its exterior with a waterproof material and with a metallic deposit on its bore; and Fig. 3, a corresponding view showing the finished copy or duplicate.

In all of the above views corresponding parts are represented by the same numerals of reference.

1 represents an ordinary cylindrical phonograph-record made of a soap or soap-like composition, as is common, having a tapered bore, the record being formed on its exterior face in a spiral groove. Assuming that a record of this character is to be copied in metal, I first secure a matrix 2 of the record. Preferably this matrix is formed by first coating the original record with a minutely-thin film of metal by a process of vacuous deposit, as I describe in my Patent No. 526,147, dated September 18, 1894, after which the film so secured is plated, preferably with copper, by an electrodeposition process until a matrix having a thickness of about one thirty-second of an inch is secured. The matrix obviously may be made by other processes; but that indicated is advantageous, because of its great accuracy. The record 1 is now removed from the matrix 2 either by melting out the cylinder or by subjecting it to cold, so as to shrink it from the matrix, or in any other way. Obviously I will now have secured a thin cylindrical matrix carrying on its bore a copy in negative or relief of the record originally formed in intaglio on the cylinder 1. This matrix is coated on its exterior and upper and bottom faces with a suitable waterproof composition—such as stearin, paraffin, or other water-repellent substance—said coating being indicated in Fig. 2 by the numeral 3, and after being so prepared the waterproofed matrix is suspended in a plating-bath and a coating 4 of a different metal from the matrix is de-

posited on the bore thereof and directly upon the record in negative or bas-relief. The metal which is thus deposited on the bore of the matrix is preferably silver when the matrix is formed of copper. The deposit of the layer 4 of different metal is continued until a coating of sufficient thickness is secured, one of a thirty-second of an inch being ordinarily sufficient. The matrix 2 is now removed from the deposited metal 4 in any suitable way, but preferably by an acid treatment, which dissolves the metal of the matrix 2 without affecting the metal of the deposit 4. When the matrix is formed of copper and the deposited metal 4 is silver, the matrix carrying the deposit may be immersed in a hydrochloric-acid solution, which will dissolve the copper matrix without affecting the silver deposit. Having thus dissolved or otherwise removed the matrix from the deposited metal, it will be obvious that I am enabled to secure a metallic shell of the desired thickness, carrying on its surface an absolutely faithful copy of the original record. The shell thus secured can be used without further treatment in a reproducing or duplicating apparatus; but it preferably is provided with a backing 5, of plaster-of-paris, cement, or any other suitable material, which may be conveniently formed with a tapered bore for use on an ordinary phonograph or mechanical duplicating machine.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The process of making a metallic duplicate from an original phonograph-record, which consists in first forming a matrix in relief of the original record, in then depositing a metal upon the matrix, and in finally removing the matrix from the metal deposited thereon, substantially as set forth.

2. The process of making a metallic duplicate from an original phonograph-record, which consists in depositing a metal upon an original record so as to form a matrix with the record in relief or negative thereon, in depositing a metal upon the matrix whereby the record will be formed in positive upon the deposited metal, and in separating the matrix from the deposited metal, substantially as set forth.

3. The process of making a metallic duplicate from an original phonograph-record, which consists in forming a metallic matrix of the original record, in depositing a different metal upon the metallic matrix, and in dissolving the metallic matrix from the metal deposited thereon, substantially as set forth.

4. The process of making a metallic duplicate from an original phonograph-record, which consists in depositing a metal upon the original record to form a matrix with the record in relief, in depositing a different metal upon the matrix, and in dissolving the metallic matrix from the deposited metal, substantially as set forth.

5. The process of making a metallic duplicate from an original phonograph-record, which consists in forming a metallic matrix of the original record, in waterproofing the matrix except on such portions carrying the record in negative, in depositing a different metal upon the uncoated portion of the matrix, and in removing the matrix from the deposited metal, substantially as set forth.

6. The process of making a metallic duplicate from an original phonograph-record, which consists in forming a metallic matrix of the original record, in waterproofing the matrix except on such portions carrying the record in negative, in depositing a different metal upon the uncoated portion of the matrix, and in dissolving the matrix from the deposited metal, substantially as set forth.

7. The improved process of making a metallic copy of a cylindrical phonographic record, which consists in depositing a metal upon the cylindrical record to form a matrix, in separating the original record from the matrix, in depositing a different metal upon the bore of the matrix, and in separating the matrix from the deposited metal, substantially as set forth.

8. The improved process of making a metallic copy of a cylindrical phonographic record, which consists in depositing a metal upon the cylindrical record to form a matrix, in separating the original record from the matrix, in depositing a different metal upon the bore of the matrix, and in dissolving the matrix from the deposited metal, substantially as set forth.

9. The improved process of making a metallic copy of a cylindrical phonographic record, which consists in depositing a metal on the original record to form a cylindrical matrix, in waterproofing the exterior of the matrix, in immersing the matrix in a plating-bath and depositing a different metal on its bore, and in removing the matrix from the deposited metal, substantially as set forth.

10. The improved process of making a metallic copy of a cylindrical phonographic record, which consists in depositing a metal on the original record to form a cylindrical matrix, in waterproofing the exterior of the matrix, in immersing the matrix in a plating-bath and depositing a different metal on its bore, and in dissolving the matrix from the deposited metal, substantially as set forth.

11. The process of making a metallic duplicate from an original phonograph-record, which consists in securing a copper matrix of the original record, in depositing silver on the matrix, and in subjecting the combined matrix and silver deposit to the action of hydrochloric acid to dissolve the copper, substantially as set forth.

12. The process of making a metallic duplicate from an original phonograph-record, which consists in depositing copper on the original record to form a matrix, in depositing silver upon the copper matrix, and in

subjecting the matrix and its silver deposit to the action of hydrochloric acid to dissolve the copper, substantially as set forth.

13. The improved process of making a metallic copy of a cylindrical phonographic record, which consists in depositing copper upon the original record to form a cylindrical matrix, in depositing silver upon the bore of the cylindrical matrix, and in subjecting the matrix and silver deposit to hydrochloric acid to dissolve the copper from the silver, substantially as set forth.

14. The improved process of making a metallic copy of a cylindrical phonographic record,

which consists in depositing copper upon the original record to form a cylindrical matrix, in waterproofing the exterior of the copper matrix, in depositing silver upon the interior of the matrix, and in subjecting the matrix and silver deposit to hydrochloric acid to dissolve the copper from the silver, substantially as set forth.

This specification signed and witnessed this 30th day of April, 1900.

THOMAS A. EDISON.

Witnesses:

J. F. RANDOLPH,  
FRANK L. DYER.